STATUS of AUTOMATED SITE PLANNING in the DOD

Presenter: Phillip C. Wager, NAVFAC Engineering Service Center
34th United States Department of Defense Explosives Safety Seminar
July 13-15, 2010

ABSTRACT

Efforts are well underway to merge the three major automated explosives safety site planning (ASP) software packages known as ASHS, ESS and MSS. The work began in earnest in January 2009 and is expected to be completed by the end of fiscal year 2011. The project is sponsored by the Department of Defense Explosives Safety Board (DDESB), the Air Force Safety Center (AFSC, Albuquerque, NM) and the Logistics Research and Engineering Directorate (LRED, Picatinny Arsenal, NJ). The work is being executed by the NAVFAC Engineering Service Center (ESC), Targeted GeoSystems (TGS, formerly LESCO) and Integrated Systems Analysts (ISA).

The merged software will contain the "best of breed" features of each software package and provide a streamlined, more efficient method to execute explosives safety site planning in the DoD. Once completed, the software will provide a full capability to site explosives storage, handling and maintenance facilities at existing installations, as well as the layout of combat vehicles/aircraft parking and new facilities in the expeditionary environment.

This paper reviews the major objectives of the project, the progress-to-date, and the schedule for completion of the work.

BACKGROUND

Automated site planning is primarily accomplished DoD-wide using three applications: Assessment System for Hazard Surveys (ASHS) (Air Force), Explosives Safety Siting (ESS) (Army, Navy and Marine Corps) and Munitions Survivability Software (MSS) (Army Expeditionary site planning).

The three software applications – ASHS, ESS and MSS – have been developed to meet the specific needs of the respective target customer(s) and each meets the majority of those needs in their current state. As is typical of software systems however, few of them satisfy 100% of the customer requirements.

All three software programs were developed in response to urgent, specific explosives safety siting requirements that differed from one Service to another. Even though each meets those needs well, evolving DoD needs and requirements for the future have brought explosives safety approval authorities together to develop plans to bring the best features of each of these software applications together into one "best-of-breed" system that is designed to meet the needs of explosives safety planners throughout all of the DoD. Approval authorities in all Services agree that it is more cost effective to field and maintain automated site planning software as one single application, rather than maintain three separate software applications.

The Automated Site Planning (ASP) Working Group has been organized and consists of subject matter experts and approval authorities from the DDESB, AFSC, Naval Ordnance Safety & Security Activity (NOSSA), the US Army Technical Center for Explosives Safety (USATCES),

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14. ABSTRACT
Efforts are well underway to merge the three major automated explosives safety site planning (ASP) software packages known as ASHS, ESS and MSS. The work began in earnest in January 2009 and is expected to be completed by the end of fiscal year 2011. The project is sponsored by the Department of Defense Explosives Safety Board (DDESB), the Air Force Safety Center (AFSC, Albuquerque, NM) and the Logistics Research and Engineering Directorate (LRED, Picatinny Arsenal, NJ). The work is being executed by the NAVFAC Engineering Service Center (ESC), Targeted GeoSystems (TGS, formerly LESCO) and Integrated Systems Analysts (ISA). The merged software will contain the best of breed features of each software package and provide a streamlined, more efficient method to execute explosives safety site planning in the DoD. Once completed, the software will provide a full capability to site explosives storage, handling and maintenance facilities at existing installations, as well as the layout of combat vehicles/aircraft parking and new facilities in the expeditionary environment. This paper reviews the major objectives of the project, the progress-to-date, and the schedule for completion of the work.

15. SUBJECT TERMS

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USMC PM Ammo, and several other DoD organizations. The ASP Working Group oversees the automation of the explosives safety site planning process.

THE DECISION TO MERGE EXISTING ASP SOFTWARE

In 2006, the DDESB requested and received ownership of the Explosives Safety Siting (ESS) software from the DoD. Along with the request of ownership came a DDESB commitment to complete the ESS software development and fund the fielding and annual maintenance costs of the software.

In July 2007 the Air Force Safety Center proposed a study to determine the feasibility of merging the Air Force sponsored ASHS software with the ESS software in an effort of economy and to have all Services using the same process for automated site planning. The study was conducted in 2008 and resulted in the DDESB, AFSC and LRED reaching a unanimous agreement to combine their resources and develop a hybrid ASP software application that contained the best features of ASHS, ESS and MSS. Work began in earnest on the merger work in early 2009.

DEVELOPMENT OF THE ASP REQUIREMENTS DOCUMENT

In about 1990, a tri-Service committee was formed to develop functional requirements and a technical approach to automate the explosives safety quantity-distance (QD) analysis process and assist planners in the preparation of explosives safety site plan packages. A formal technical plan and statement of work was prepared in 1993. The DoD provided funding in about 1995 to begin ASP work and an updated requirements document was developed and published at that time. By 2008, technology had advanced so much that a major update to the ASP requirements was badly needed.

Several meetings were held with subject matter experts in FY 2008-09 to capture current ASP requirements from each Service. An attempt was made to capture all requirements whether or not they were already met with existing software, and without regard to the availability of funds required to develop new capabilities.

Revision 1 of the updated requirements document was published in February 2009 by the NAVFAC Engineering Service Center as Technical Report TR-2310-SHR (Revision 1), “Automated Explosives Safety Site Planning Requirements Document”. Principal authors of the report were Phillip Wager (NAVFAC ESC), Larry Becker (ISA) and Jeff Smith (LESCO, now TGS).

Additional requirements for automated expeditionary site planning were captured in late 2009. Those requirements, along with several other updates to ASP requirements have been added to Revision 2 of the ASP Software Requirements Document (SRD) which is currently in final draft awaiting publication.

PRIORITIZATION OF REQUIREMENTS

Once all valid requirements were identified in the SRD, additional meetings and discussions were held to prioritize these requirements against available funding and time constraints.

Members of the ASP Working Group evaluated ASHS, ESS and MSS software applications against the SRD and identified the strengths and weaknesses of each software application.

The Air Force has the most critical timetable for the rollout of the new software, so priorities and tasks outlined for the release of the hybrid software are especially sensitive to those needs.

A balanced plan has been developed by the ASP Working Group that will meet ASP minimum requirements by the October 2011.

FY09-10-11 WORK PLAN

Actual work on the software merger began in FY09 starting with the identification of additional data elements that would need to be added to the software. A new data model was developed and a transition to the new data model has begun. Major tasks executed in the initial planning stage of the project are listed in Table 1.

Table 1. Initial Planning Tasks

Task	Title	Description
1	Configuration Management	Establish Configuration Management procedures and tools to allow multiple organizations to exchange information, and share the most current versions of documents, reference files and software source code.
2	Finalize DoD Flowcharts of siting criteria	Establish the foundation/baseline upon which Service-specific criteria flowcharts will be developed.
3	Develop Flowcharts for AF siting criteria	Develop flowcharts of the Air Force siting criteria based on the DoD flowchart structure.
4	Identify New Data Elements	Identify all data that must be tracked in the software and expand the current data model to accommodate all data.
5	Identify Mandatory Functionality Requirements	Extract from the SRD all ASP requirements that must be in the hybrid software.
6	Develop New ASP Data Model	Expand the current ASP data model to include all new data elements identified.
7	Move existing ASP Functionality into New Data Model	Transition existing functionality of the ESS software application so that it is operational in the new data model.

The balance of the merger work has been divided between two phases of work. Phase 1 tasks are listed in Table 2 and consist of fundamental capabilities that need to be evaluated and validated prior to adding on additional software functionality.

Table 2. Phase 1 Planning Tasks

Task	Title	Description
1	Correlate Navy and AF Flowcharts with finalized DOD Flowcharts	While the DoD flowcharts were being finalized, the AF flowcharts were under development and the Navy flowcharts were frozen. Make final adjustments to AF, Navy and DoD flowcharts to correlate them as necessary.
2	Develop AF and Navy QD Engines	Update the current Navy QD Engine and develop the AF QD Engine modules according to finalized flowcharts.
3	Incorporate Numerous Technical Capabilities	For example, barricade analysis, automatically assigning relationships between Potential Explosion Sites (PES) and Exposed Sites (ES), reduced QD criteria, etc.
4	Update QD Engine Validation Library	Add validation problems to the QD Engine validation library to rigorously test the accuracy of QD Engine computations using DoD, AF and Navy criteria modules.
5	Develop Automated Tool to Export ASHS data into New Data Model	Develop a software tool to read ASHS graphic and relational data developed at AF installations and convert this data for use in the new ASP data model format.
6	Develop Tools for Siting New Facilities	Insert facilities, aircraft, and vehicles using graphical templates, etc.
7	Expand ASP to Accommodate Multiple "What-if" Scenarios	Allow the user to store and process multiple explosives storage scenarios for PES facilities without modifying or overwriting approved NEW limits.
8	GIS Compare and Update Tool	Allow the user to quickly and rapidly compare and update electronic maps used in the ASP software to stay current with improved maps, new construction and demolition projects at an installation.
9	Standardized DoD Format for Site Approval Requests	Coordinate and refine a joint-service format when preparing site plan submittal documents and maps.
10	Perform Database Consistency Checks	Design a set of comprehensive checks to make sure that edits and updates to data do not introduce inconsistencies in the database that could lead to disconnects in the database, or incorrect computations and reports.

The Phase 1 version of the software, with basic AF functionality, is scheduled to be delivered for AFSC use in October 2010. While the AFSC is conducting acceptance testing, Phase 2 work will begin which will add higher-level functionality (see Table 3). The Phase 2 version of the software is scheduled for delivery in March 2011. Small scale testing will be executed through July 2011, and development of training materials and large scale implementation plans will begin shortly thereafter.

Table 3. Phase 2 Planning Tasks

Task	Title	Description
1	Pre-Defined Reports	Create numerous special tabular and graphic reports on the ASP data as defined in the SRD.
2	Develop Selected Software Wizards	Software Wizards are tutorials on specific subjects that assist inexperienced users in executing specific software tasks while doing real work. Wizards will include subjects such as how to update information in the database, how to mitigate "violations" of the siting criteria, and detection and resolution of missing data.
3	Real Property Inventory (RPI) Compare and Update Tool	Compare ASP RPI information with Service databases, which are constantly being updated. Automate the updating of ASP data to match the more current RPI data.
4	Bulk Facility Editing Tool	Allow the user to edit a common facility attribute by changing it one time and applying the change to multiple facilities. For example, after selecting 15 facilities, the user inputs an attribute that these facilities are non-combustible. The non-combustible attribute is assigned to all 15 facilities.
5	Strong Map Editing Capabilities	Expand map editing and data editing tools available in ASP software.
6	Merge MSS Functionality into ESS	Convert the MSS functionality to become a dependent module of the ESS software.
7	Expeditionary Site Planning	Add additional functionality identified in the SRD to allow the use of ASP software to perform expeditionary site planning.
8	Incorporate Numerous Technical Capabilities	For example, status of waivers and exemptions, and assignment of site plan identification numbers to facilities.

THE ASP SOFTWARE ARCHITECTURE

ESS consists of four major software modules: ESS Tool Kit, ESS Site Planner, QD Calculator and QD Engine. The general model of the ASP software is shown in Figure 1.

The ESS Tool Kit contains tools that facilitate working with geospatial map data (e.g., buildings, roads, property boundaries data layers, etc.) for DoD installations. Geospatial installation map data is combined with real property information (including the DoD Construction Category Codes), and explosives information associated with any facility that is used for storage, handling or processing of explosives-related materials.

The ESS Tool Kit supports qualifying the merged infrastructure data so QD analysis results are accurate. For example, ESS checks facilities shown graphically on the map against RPI records to make sure each facility exists in both databases. The Tool Kit enables preparation of various reports and displays that identify anomalies that need resolution prior to performing a QD

analysis. Using this tool set helps ensure that appropriate individuals maintain the facility-associated data, rather than the explosives safety staff. This approach involves subject matter experts to the benefit of many facilities management applications. Hence, the quality of the data and associated analyses improves.

Direct use of installation facilities management information fully integrates ESS with the installation master plan. Resolving discrepancies between these data sets often represents the bulk of the work required to get ESS operational at an installation.

The installation map must be in ESRI ArcView shapefile or geodatabase feature class format. The supporting databases can be in MS Access, SQL Server or Oracle. The software will run on all Windows-based operating systems.

The ESS Site Planner contains tools to automatically generate and manage ESQD Arcs and create site-approval request documentation for all facilities represented in a geospatial map that have the required attribute data. Graphical results represent violations of the criteria by connecting the offending facilities with a bold red line. The Site Planner also assists the user in managing site plans in various states such as draft, proposed, submitted, approved, or archived.

Once the submittal package is prepared in an electronic format, the user can transmit it up the chain of command for review and approval. Approval authorities can review, measure, annotate and comment on the electronic data package using Adobe Acrobat PDF viewing software.

ESS Site Planner uses the same maps and data used for other facilities planning tasks at a typical DoD installation. In addition to being compatible with installation master planning, ESS Site Planner is compatible with emerging risk-based management criteria.

The ESS QD Calculator is a simplified application used to evaluate a PES/ES pair against the DoD and Service-specific explosives safety siting regulations. The Calculator does not require maps or other complex data input to function. However, it does require all the explosives safety attributes contained in the siting regulations. The Calculator operates on data entered by the user and operates in two modes:

1. The QD mode computes the minimum allowable required separation distance given the type and quantity of explosives.
2. The distance-quantity (DQ) mode computes the allowable type and quantity of explosives that can be stored in the PES for any ES/PES combination when distance between the two facilities is known.

The QD Calculator, like the ESS Site Planner, relies on the QD Engine to compute the result of a given problem. Therefore, the results produced by the Site Planner and the QD Calculator for any ES/PES combination will be identical.

Despite producing the same result, significant differences exist between the Site Planner and the QD Calculator. The most notable difference is how the data for an analysis is prepared before being sent to the QD Engine. The Site Planner operates on a database that contains lists of ES/PES combinations, and all of their attributes. The Site Planner automatically generates all applicable combinations of ES/PES pairs, and then automatically and sequentially calls the QD Engine for each pair to compute a quantity or distance. The Site Planner saves the results to tables that are later used as the basis for graphical display on the monitor. The QD Calculator only allows keyboard entry of information regarding a single ES/PES pair. It uses various menus

to request relevant parameters and attributes. After the user prepares the data, he/she sends the problem to the QD Engine for calculation. The computation results are text-based. No graphical results are displayed.

The Tool Kit, Site Planner, and QD Calculator each access the QD Engine module to perform siting analysis and generation of violations. The QD Engine module is based on a logic analysis performed on each of the DoD, Army and Navy and Air Force criteria documents. The logic analysis results are published in flowcharts, which have been reviewed and approved by appropriate subject matter experts. The flowcharts serve as the blueprints for the programming of the QD Engine. The QD Engine contains sub modules that automate the explosives safety criteria of the DoD, Army, Navy and AF explosives safety standards. Given a set of attribute data for an ES, PES, and the explosives, the QD Engine follows pre-determined logical paths to determine the applicable criteria and perform a siting analysis using the equations or tables defined in the criteria.

The QD Engine is designed to operate as an independent sub module to any host software package. It is currently operational in ESS, MSS and HAZX software applications.

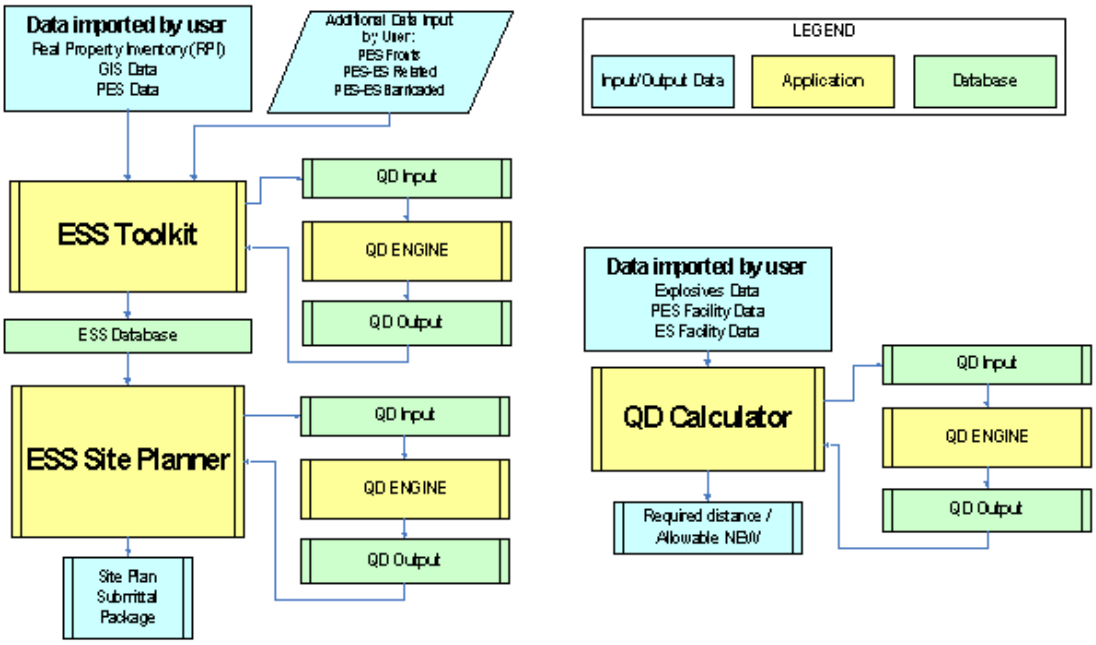


Figure 1. The ESS Software General Model

VALIDATION AND VERIFICATION OF ASP SOFTWARE

Validation of a software package can be expressed by the question “Did we build the right thing?”. Verification of a software package can be expressed by the question “Did we build it right?”.

The validation of the ASP software has been ongoing for many years. Explosives safety approval authorities in the DoD and the Services, and users in the field, have validated that the ASP software currently in use within the DoD is built to do the right thing.

The verification process (see Figure 2) for the ASP software has been developed to make sure that the software is operating correctly and giving the right answers. Five verification steps are required in the development and fielding of ASP software and are shown in Figure 2 as yellow boxes.

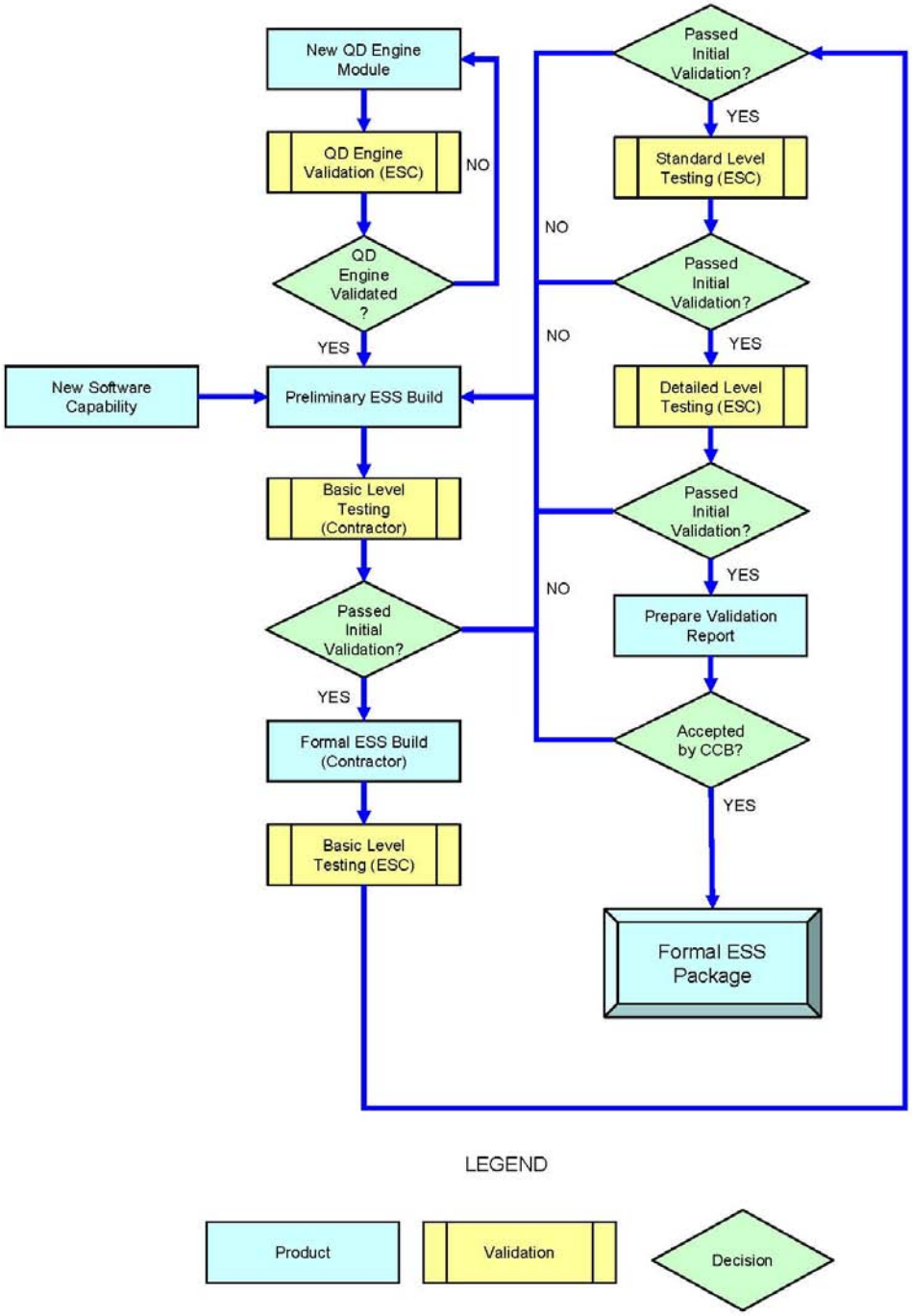


Figure 2. The Verification process for ESS

The QD Engine module is developed based on detailed flowcharts that represent a mathematical and logical analysis of the DoD and Service explosives safety siting criteria. As flowcharts for each set of criteria are developed, they are reviewed in depth and approved by subject matter experts at the appropriate safety center(s). For example, the flowcharts used to automate the DoD 6055.09-STD criteria have been reviewed and approved by the DDESB. The QD Engine module is programmed to exactly match the logic shown in those flowcharts. The flowcharts used to automate AFMAN 91-201 have been reviewed and approved by AFSC and DDESB approval authorities, etc.

Approval authorities have endorsed a library of thousands of validation problems with "expected answers" that has been developed to track every logic path on every flowchart, along with specific problems designed to test the accuracy of results anywhere in the criteria.

Every version of the QD Engine is tested against every problem in the validation library. Computed results are automatically compared with "expected" results. Differences are logged in a violation report. Reasons for any differences are researched and resolved according to the expectations of appropriate approval authorities.

The QD Engine cannot be released until it satisfactorily processes the validation library.

Testing of each version (or build) of the ESS software is labor intensive and requires approximately two man-weeks of labor to complete (assuming that no problems are encountered in the software). Any findings identified in the testing conducted are classified into three categories: Critical Issues, Issues and Minor Issues. A "Minor Issue" is considered to be a cosmetic problem that is easy to fix. An "Issue" describes a significant software problem, but it can be overcome by using a "workaround" procedure. A "Critical Issue" is a software problem that prevents the user from accomplishing an essential task. Software testing is not allowed to proceed to a higher level until all Critical Issues have been resolved. Issues and Minor Issues are resolved as soon as practical, but the existence of these types of problems will not prevent the release of a new version of the software.

Basic testing on the ESS Site Planner and Tool Kit software is conducted in two phases. The contractor first conducts tests using several prepared data sets to make sure that recent bug fixes and software enhancements have been implemented correctly and that basic functionality is operational. Once they are satisfied with these initial tests, the software is forwarded to ESC where additional basic tests are conducted. Details of this testing are published in the NAVFAC ESC Report, TR-2335-SHR, Validation Report, Explosives Safety Siting Software, ESS Version 6, June 2010, for the latest version of ESS.

Basic testing is structured to identify major software problems early on before a significant amount of time and effort is invested in more detailed testing. Once the software successfully passes basic testing, a standard set of testing is conducted that gets into more detail. Upon successful completion of standard testing, detailed testing is conducted to check every capability on every interface screen that was not tested in either the basic or standard testing. The detailed testing also involves running the software against several carefully designed graphical data sets to make sure data processing and computed results are correct. These tests determine that:

1. Data is imported into the database properly
2. Processing operations on the data are giving correct results
3. The graphical display of computed output results are rendered properly

4. Graphical and tabular reports generated by the software are correct.

ESC publishes validation testing results for each major block of testing in a spreadsheet report. Archive copies of test reports are stored on a project server for each version of the software that is released. The report for each test consists of tabular descriptions of all testing results, along with a backup copy of all data, source code and executable files used in the testing. As a result, an independent reviewer can revisit and rerun these validation tests at some point in the future.

CONFIGURATION MANAGEMENT OF THE ASP PROGRAM

The merger of the ASHS, ESS and MSS software requires several organizations and contractors to take active roles in the project work. Each organization/contractor has a need to access the most current version of flowcharts, design documents, interface specifications, and source code. It has been necessary to set up a secure project server using the configuration management software SubVersion to allow all project participants access to the most current versions of these documents. This has greatly assisted in the smooth execution of the project.

This project is following guidelines published in the Capability Maturity Model Integration (CMMI) process improvement approach. ESC has reviewed the 23 CMMI process areas and has identified those areas that are applicable to this project. Some of the CMMI process areas being followed in this project include: Configuration Management, Verification, Validation, and Requirements Management.

DOD MANDATE FOR ASP

Automated site planning will significantly reduce the creation time and improve the quality of Explosives Safety Site Plan packages, reduce errors, and result in faster review and approval of submittal packages. It will assist in the identification and mitigation of explosives safety violations. It will allow installations to optimize explosives storage capacity and assist planners to identify constraints to facilitate master planning and future construction projects.

To be successfully implemented, ASP requires three data sets at the installation level:

1. Installation Map (GIS data)
2. Installation RPI Data
3. Explosives Storage Data

Since ownership of the GIS and RPI data does not fall within the responsibility of explosives safety planners, the DDESB felt it appropriate to coordinate the requirement for automated site planning with the Office of the Deputy Undersecretary of Defense, Installations and Environment (DUSD I&E), which maintains an office that does have oversight over that information. The DUSD I&E Business Enterprise Integration office concluded that the ASP data requirements fell within the expectations they have of all DoD installations.

After coordination with Service representatives, the DUSD I&E Real Property and Installations Lifecycle Management Investment Review Board (IRB) approved a proposal on 10 June 2010 to mandate the use of automated explosives safety site planning tools such as ASHS and ESS. The mandate will be issued by the Assistant Deputy Under Secretary of Defense (Installations and

Environment). The mandate is expected to be issued shortly and will request the Services to develop five year ASP implementation plans over the next six months and submit them to the DDESB.

Implementation plans are to include a schedule and funding plan, as well as identification of any implementation challenges that are anticipated. The DDESB will be required to monitor the Services' implementation progress and report annually to the IRB.

The DDESB has also committed to develop, host and maintain ESS for Service use, as well as assist the Services with technical assistance and Help Desk support while they transition into implementation of the software.

FUTURE PLANS

The DDESB is currently funding a project to evaluate the differences between explosives safety siting criteria in DoD 6055.09-STD and the NATO Allied Ammunition Storage and Transport Publications (AASTP)-1, "Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives," and AASTP-5, "NATO Guidelines for the Storage, Maintenance and Transport of Ammunition on Deployed Missions or Operations." Once the differences have been identified, actions will be taken to expand ASP tools to include these criteria.

The risk-based explosives siting algorithms documented in DDESB TP-14, "Approved Methods and Algorithms for DoD Risk-Based Explosives Siting," will be merged together with the ESS software within the next several years.

The modular architecture of the ESS software will also allow additional siting criteria relating to energetic liquids and tunnel magazines to be added to future releases of the software.

Status of Automated Site Planning in the DOD

Presenter:
Phillip C. Wager
NAVFAC ESC

Efforts underway to merge three Automated Site Planning (ASP) software applications

- Assessment System for Hazard Surveys (ASHS)
- Explosives Safety Siting (ESS)
- Munitions Survivability Software (MSS)

ASP software application Sponsors

- ASHS – U.S. Air Force Safety Center (AFSC)
- ESS – Dept of Defense Explosives Safety Board (DDESB)
- MSS – Logistics Research and Engineering Directorate (US Army)

Merger Rationale

- ASHS, ESS & MSS developed to meet specific needs of target customer
- Each meets the need well
- None meet 100% of the needs
- Consensus among all Services that now is good time to merge
  - Substantially lower maintenance costs
  - Significant additional capability needed to meet all needs

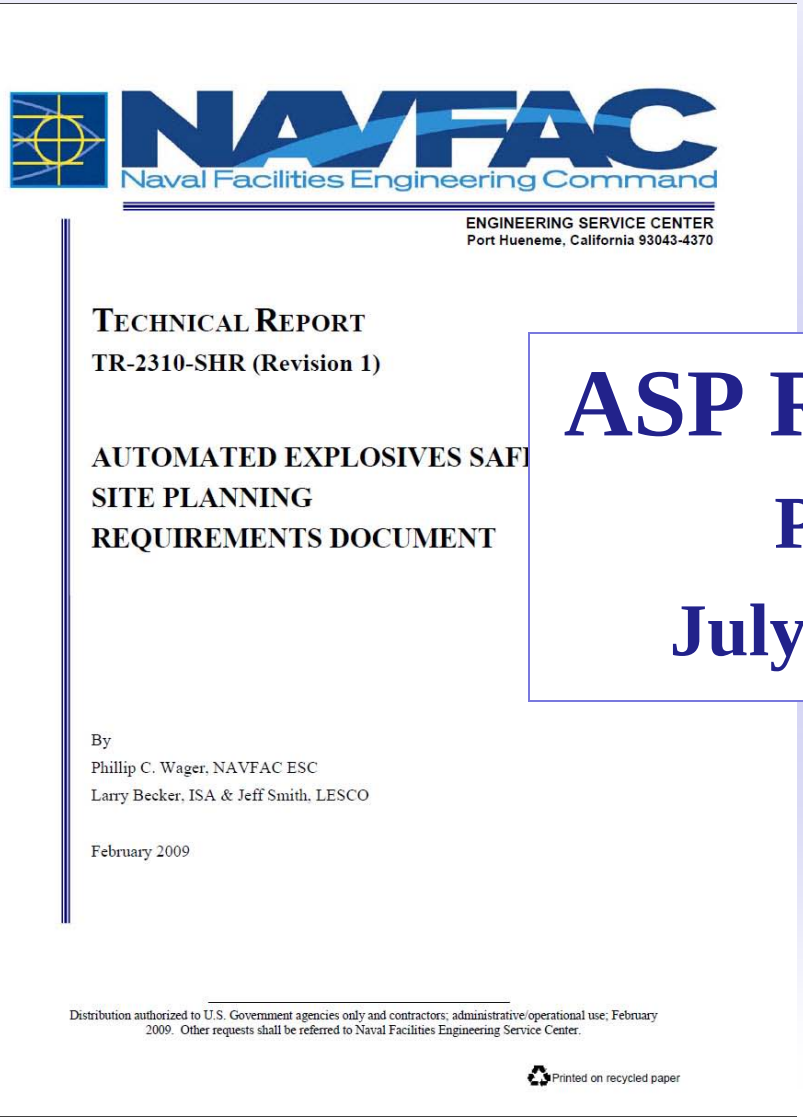
ASP Working Group

- Provides oversight for the merger work
- Subject Matter Experts / Approval Authorities
  - DDESB
  - Air Force Safety Center (AFSC)
  - Naval Ordnance Safety & Security Activity (NOSSA)
  - US Army Technical Center for Explosives Safety (USATCES)
  - USMC PM Ammo
  - Other DoD organizations

Initial Planning Tasks

- Identify Mandatory Functional Requirements
- Finalize DoD Flowcharts of DoD 6055.09-STD
- Develop flowcharts for AFMAN 91-201
- Identify new data elements
- Develop New ASP Data Model
- Move existing ASP Functionality into New Data Model
- Configuration Management

ASP
Automated Site Planning



NAVFAC
Naval Facilities Engineering Command

ENGINEERING SERVICE CENTER
Port Hueneme, California 93043-4370

TECHNICAL REPORT
TR-2310-SHR (Revision 1)

AUTOMATED EXPLOSIVES SAFE
SITE PLANNING
REQUIREMENTS DOCUMENT

By
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February 2009

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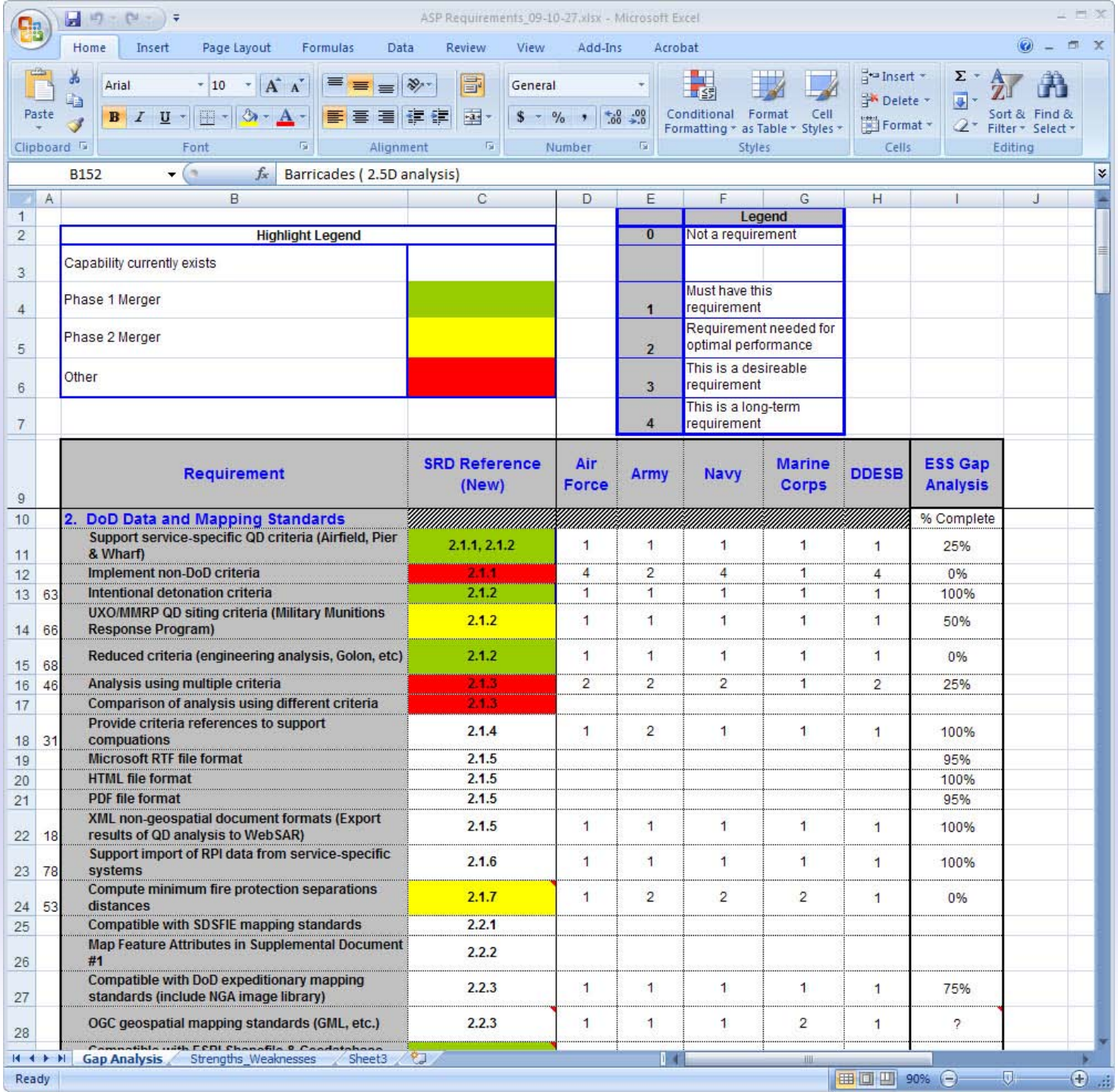
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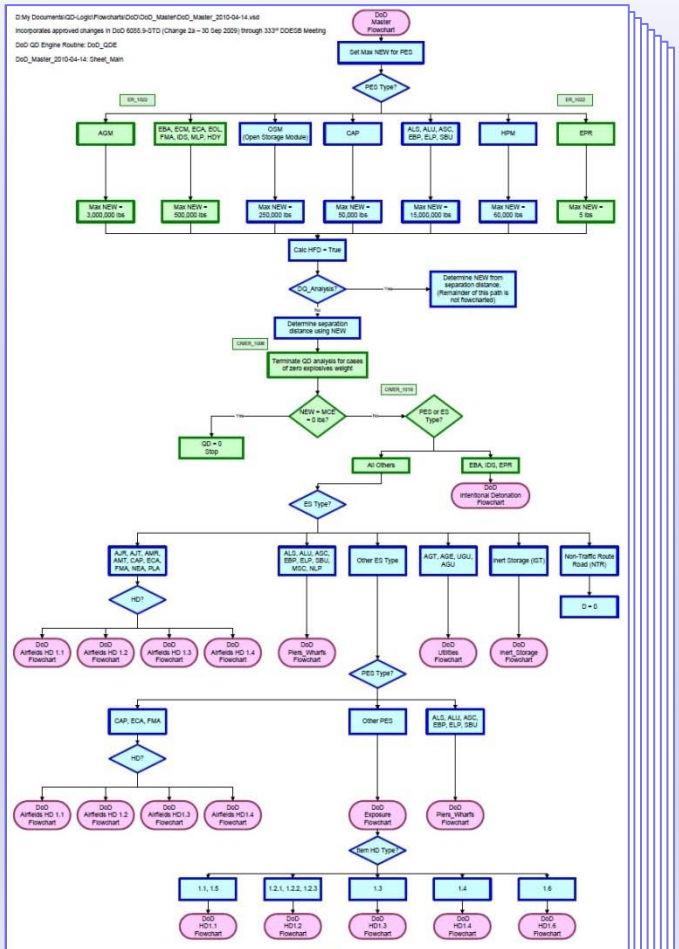
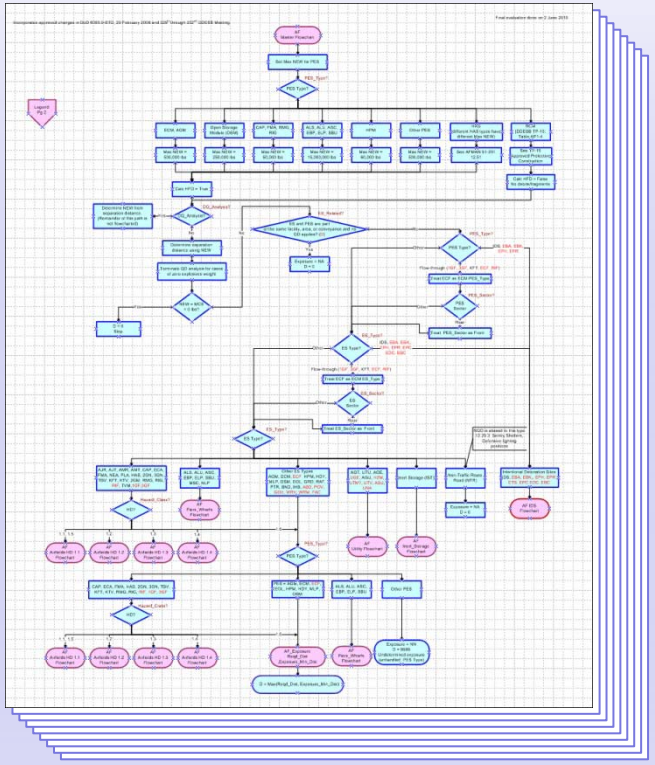
Highlight Legend
Capability currently exists
Phase 1 Merger
Phase 2 Merger
Other
Legend
0 Not a requirement
1 Must have this requirement
2 Requirement needed for optimal performance
3 This is a desireable requirement
4 This is a long-term requirement
Requirement
SRD Reference (New)
Air Force
Army
Navy
Marine Corps
DDESB
ESS Gap Analysis
2. DoD Data and Mapping Standards
% Complete
Support service-specific QD criteria (Airfield, Pier & Wharf) 2.1.1, 2.1.2 1 1 1 1 1 25%
Implement non-DoD criteria 2.1.1 4 2 4 1 4 0%
63 Intentional detonation criteria 2.1.2 1 1 1 1 1 100%
66 UXO/MMRP QD siting criteria (Military Munitions Response Program) 2.1.2 1 1 1 1 1 50%
68 Reduced criteria (engineering analysis, Golon, etc) 2.1.2 1 1 1 1 1 0%
46 Analysis using multiple criteria 2.1.3 2 2 2 1 2 25%
Comparison of analysis using different criteria 2.1.3
31 Provide criteria references to support compuations 2.1.4 1 2 1 1 1 100%
Microsoft RTF file format 2.1.5 95%
HTML file format 2.1.5 100%
PDF file format 2.1.5 95%
18 XML non-geospatial document formats (Export results of QD analysis to WebSAR) 2.1.5 1 1 1 1 1 100%
78 Support import of RPI data from service-specific systems 2.1.6 1 1 1 1 1 100%
53 Compute minimum fire protection separations distances 2.1.7 1 2 2 2 1 0%
Compatible with SDSFIE mapping standards 2.2.1
Map Feature Attributes in Supplemental Document #1 2.2.2
Compatible with DoD expeditionary mapping standards (include NGA image library) 2.2.3 1 1 1 1 1 75%
OGC geospatial mapping standards (GML, etc.) 2.2.3 1 1 1 2 1 ?
Gap Analysis
Strengths_Weaknesses
Sheet3
Ready
90%

Logic Flowcharts of Expl. Safety Criteria



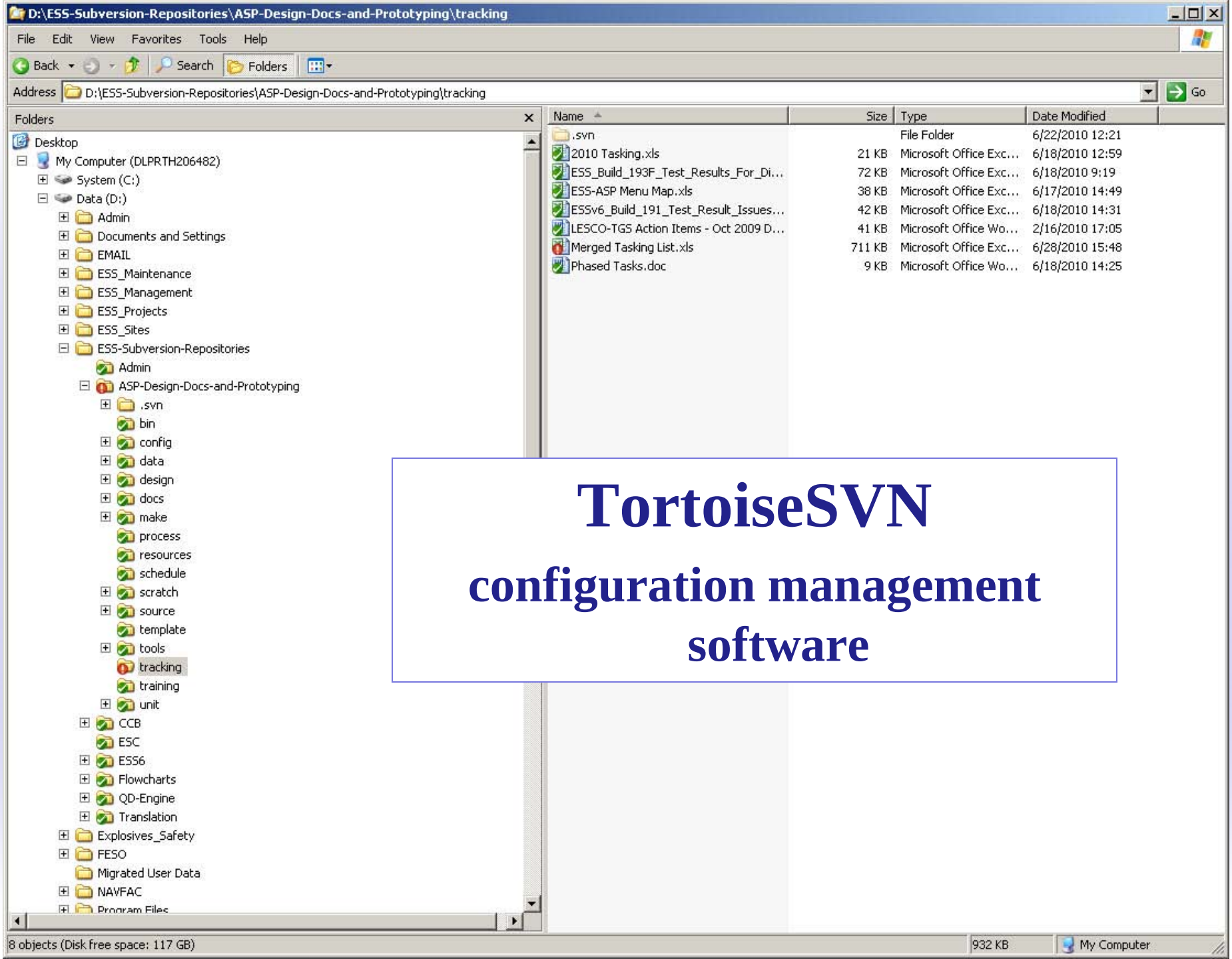
DoD Flowcharts



Air Force Flowcharts

Configuration Management of ASP Files

- Multiple Team Members require access to the same files
- Established a networked computer server to host project files
- Use (Sub)Version source control software by TortoiseSVN.
- Access to project files controlled by UN and Password
- Document repositories available in Windows Explorer



TortoiseSVN

configuration management software

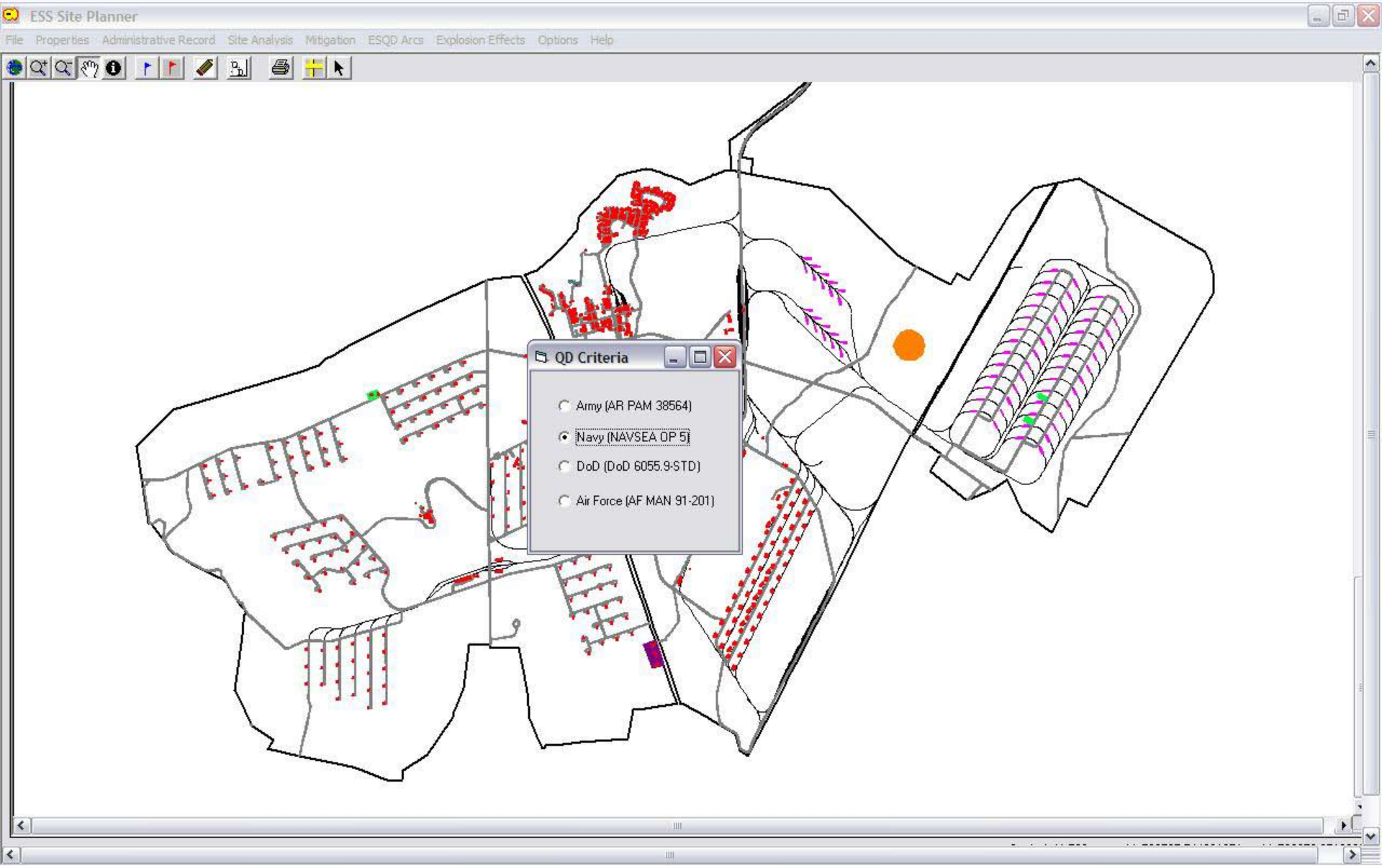
Phase 1 Tasks

- Correlate Navy & AF Flowcharts with DoD Flowcharts
- Develop Air Force and update Navy QD Engine modules
- Develop numerous technical capabilities
- Update QD Engine validation library
- Develop Automated Tool to export ASHS data into New Data Model

Phase 1 Tasks (cont'd)

- Develop Tools for Siting New Facilities
- GIS Map Compare and Update Tool
- Standardized DoD Site Approval Request Submittal Format
- Database Consistency Checks

Develop Navy & Air Force QD Engines



Phase 2 Tasks

- Extensive List of Pre-Defined Reports
- Develop Selected Software Wizards
- RPI Compare and Update Tool
- Bulk Facility Editing Tool
- Expand ASP to Accommodate Multiple “What if” Scenarios

Phase 2 Tasks (cont'd)

- Strong Map Editing Capabilities
- Merge MSS Functionality into ESS
- Expeditionary Site Planning
- Numerous Technical Capabilities

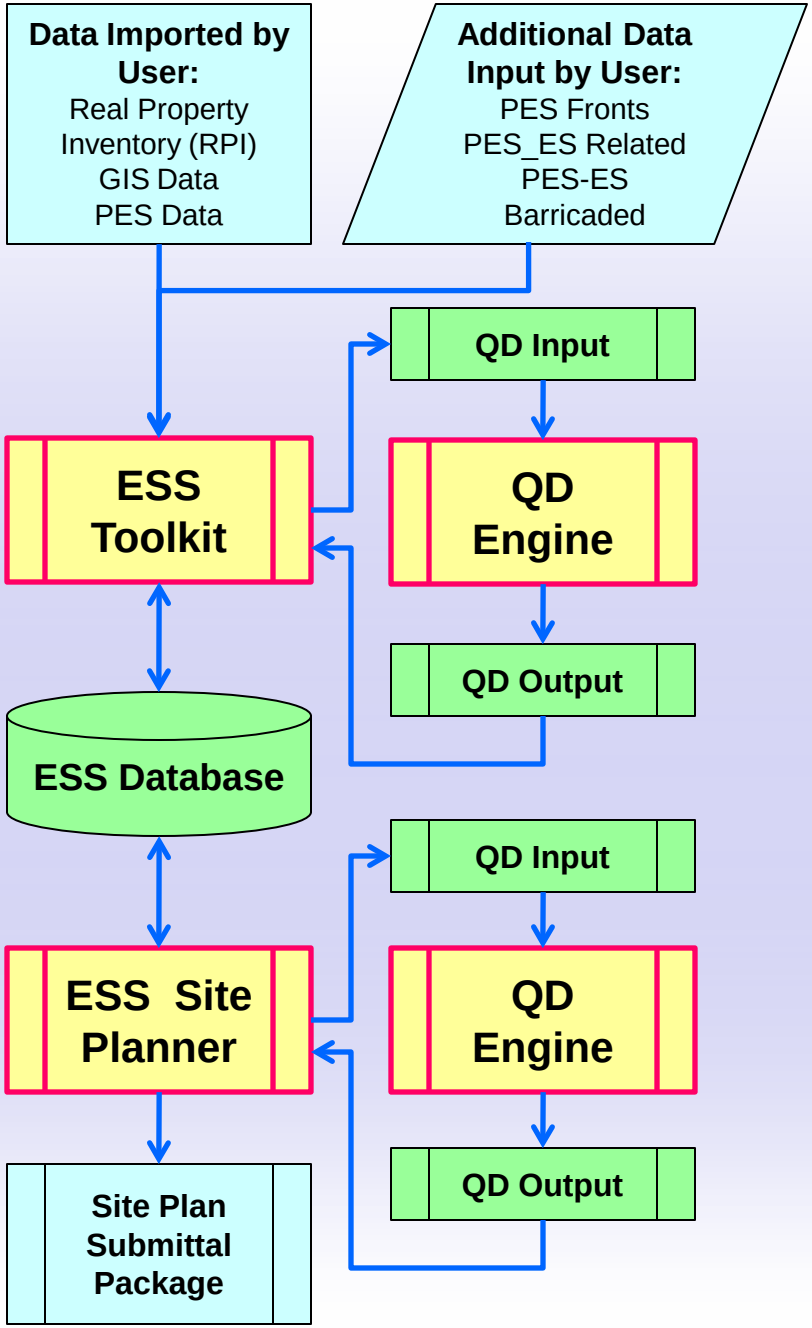
Software Validation

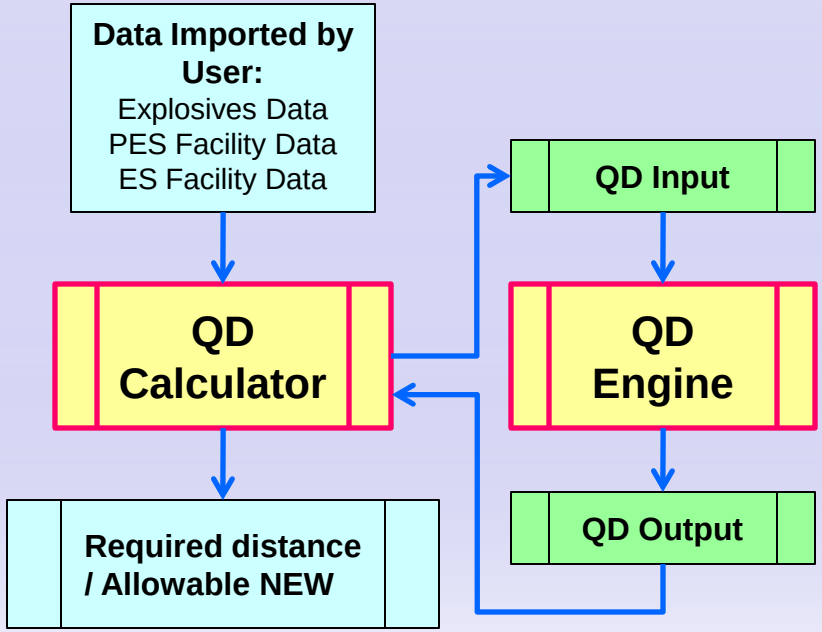
Did we build the right thing?

Software Verification

Did we build it right?

ESS Architecture

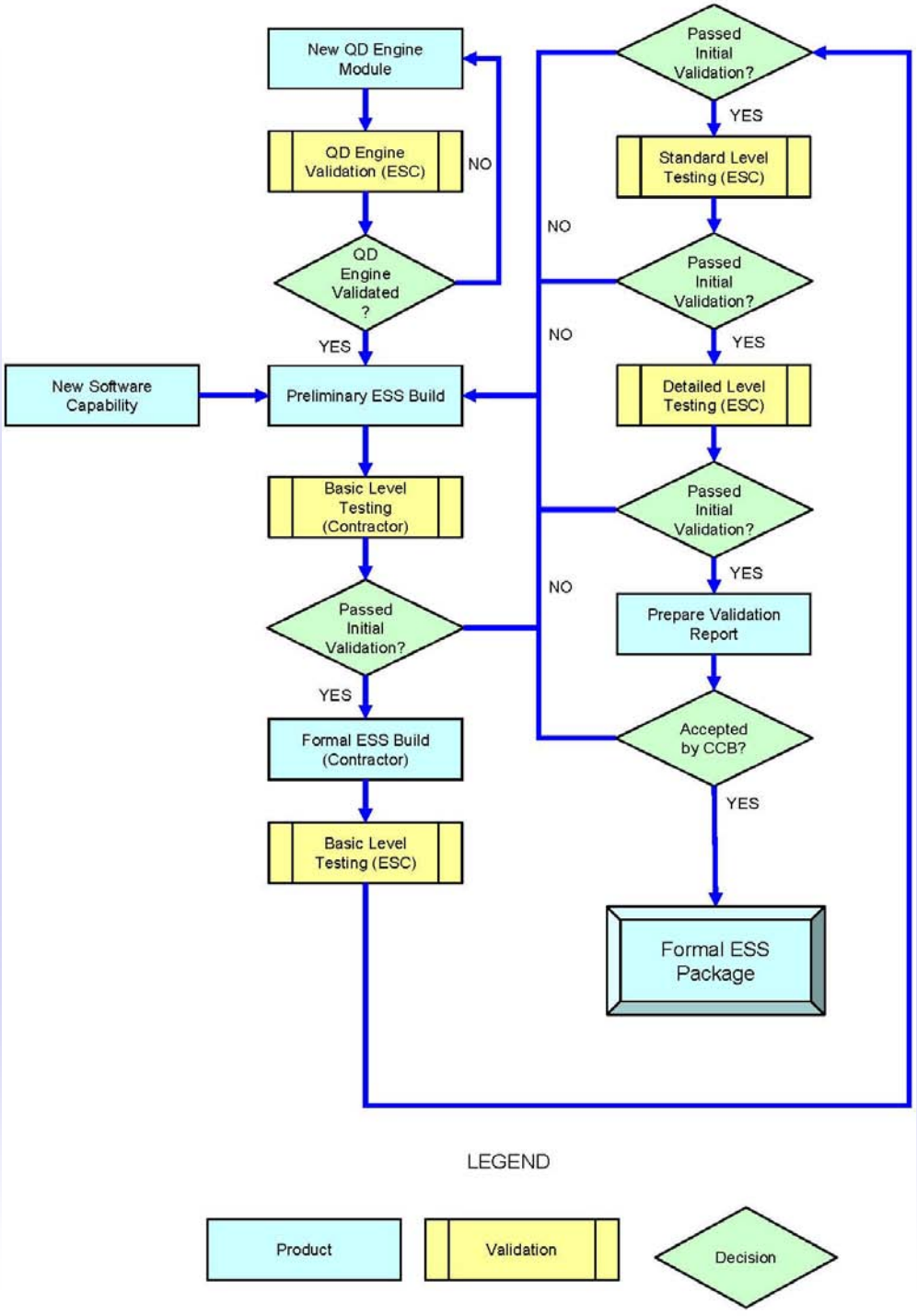




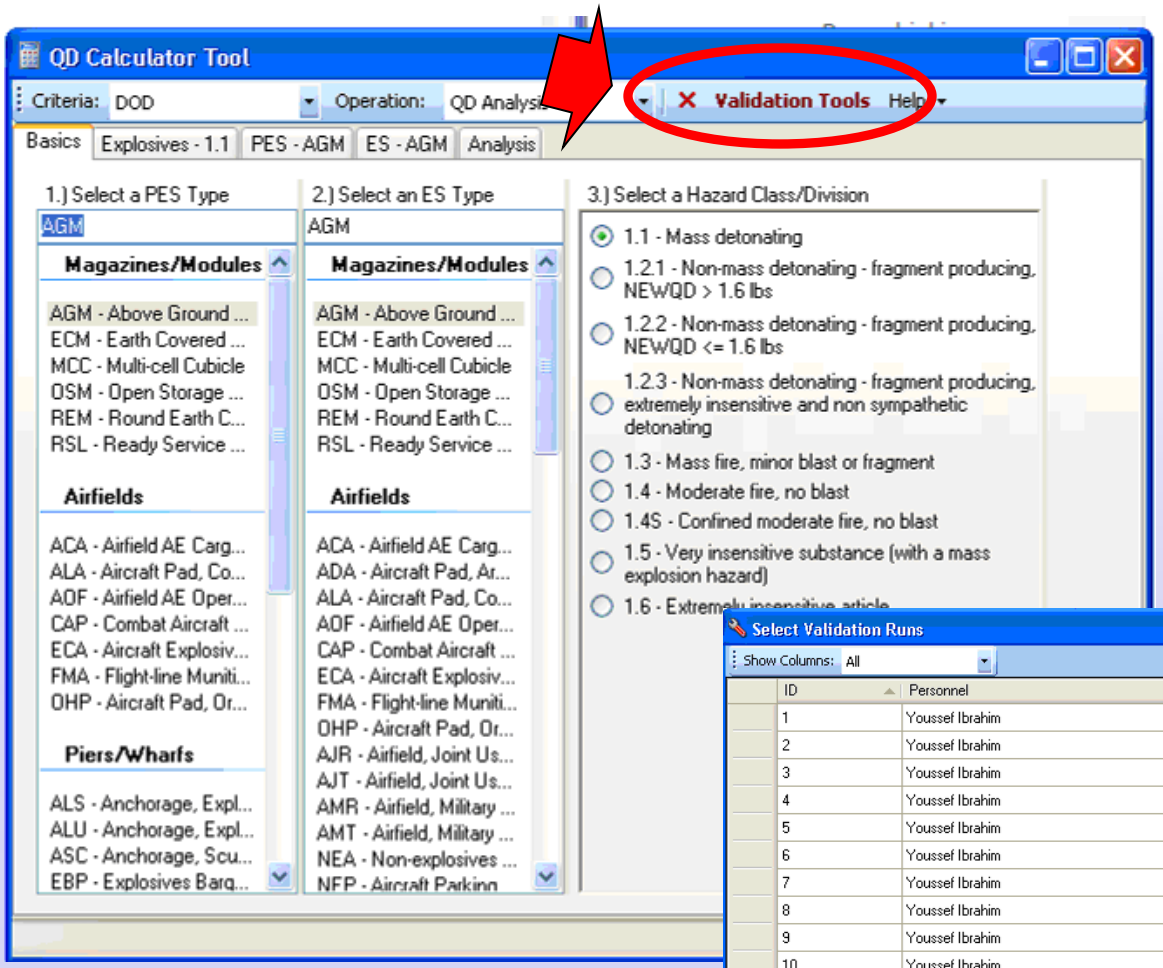
Validation/Verification Objectives

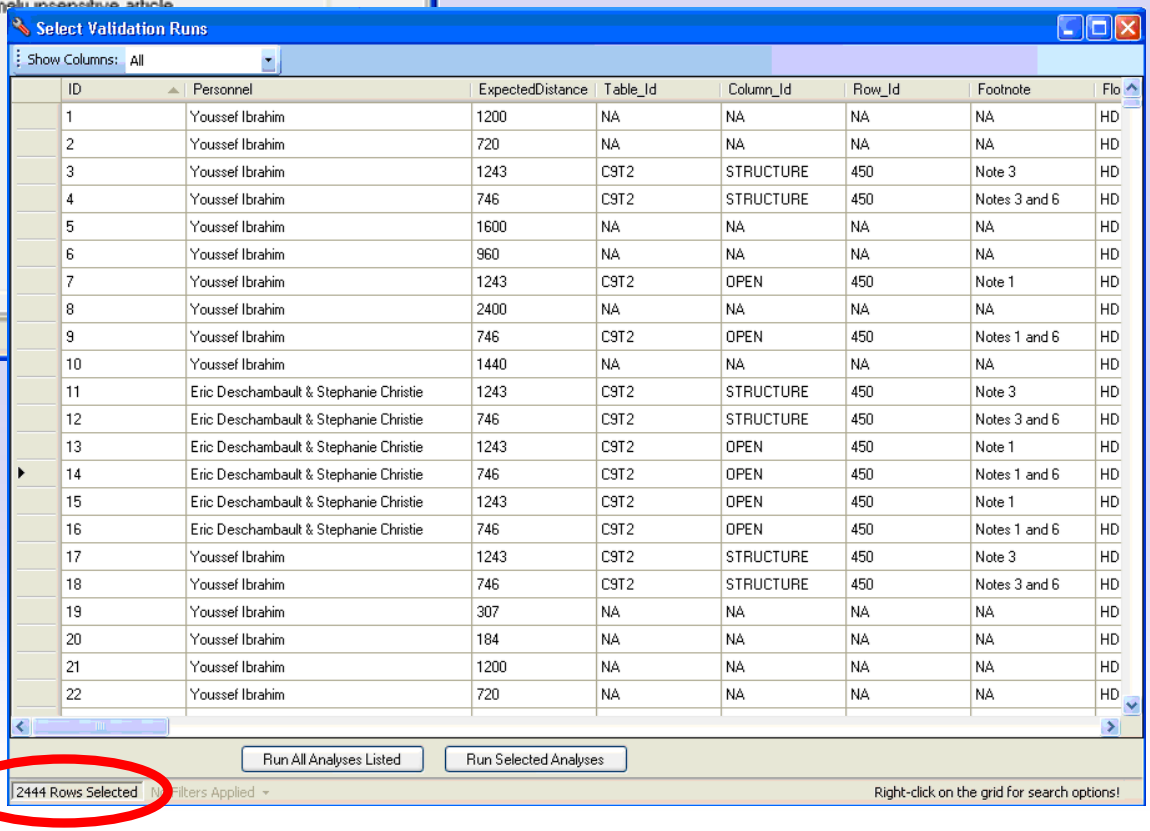
- Correct data import
- Correct data storage
- Correct data manipulation
- Correct computations
- Correct data output

Verification Procedure



Validation of the QD Engine





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3	Youssef Ibrahim	1243	C9T2	STRUCTURE	450	Note 3	HD
4	Youssef Ibrahim	746	C9T2	STRUCTURE	450	Notes 3 and 6	HD
5	Youssef Ibrahim	1600	NA	NA	NA	NA	HD
6	Youssef Ibrahim	960	NA	NA	NA	NA	HD
7	Youssef Ibrahim	1243	C9T2	OPEN	450	Note 1	HD
8	Youssef Ibrahim	2400	NA	NA	NA	NA	HD
9	Youssef Ibrahim	746	C9T2	OPEN	450	Notes 1 and 6	HD
10	Youssef Ibrahim	1440	NA	NA	NA	NA	HD
11	Eric Deschambault & Stephanie Christie	1243	C9T2	STRUCTURE	450	Note 3	HD
12	Eric Deschambault & Stephanie Christie	746	C9T2	STRUCTURE	450	Notes 3 and 6	HD
13	Eric Deschambault & Stephanie Christie	1243	C9T2	OPEN	450	Note 1	HD
14	Eric Deschambault & Stephanie Christie	746	C9T2	OPEN	450	Notes 1 and 6	HD
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16	Eric Deschambault & Stephanie Christie	746	C9T2	OPEN	450	Notes 1 and 6	HD
17	Youssef Ibrahim	1243	C9T2	STRUCTURE	450	Note 3	HD
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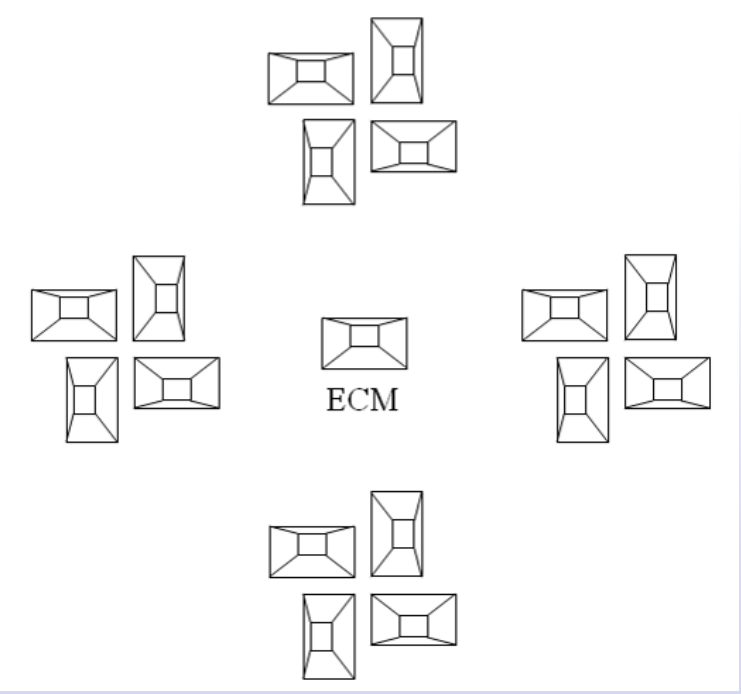
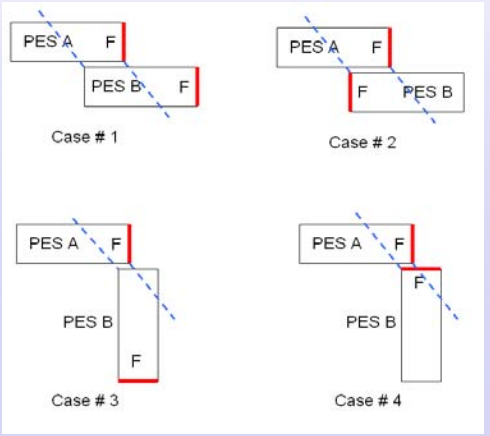
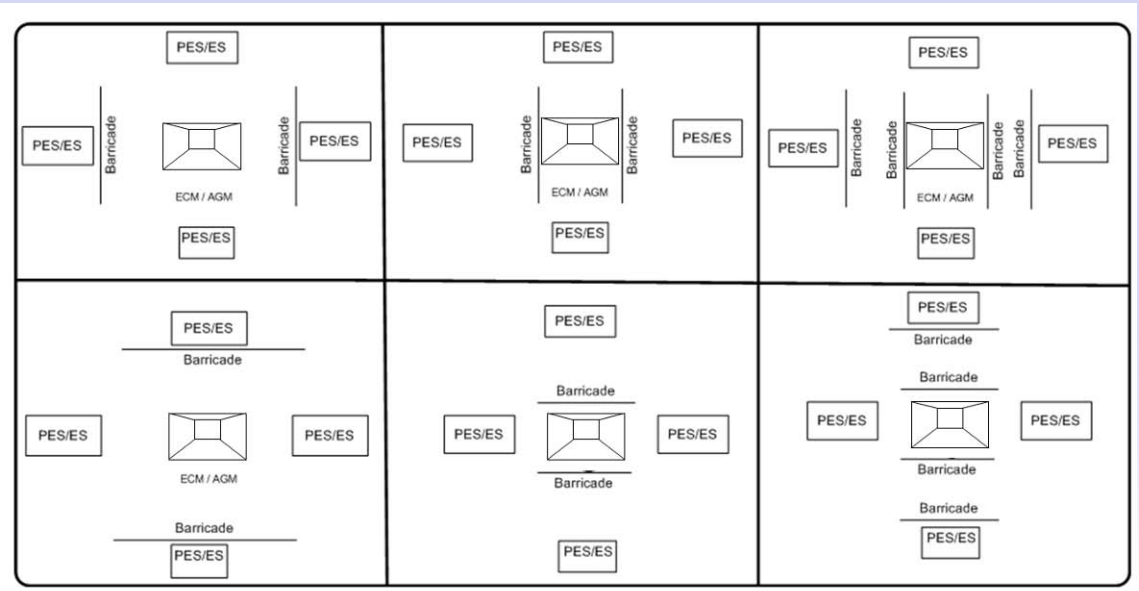
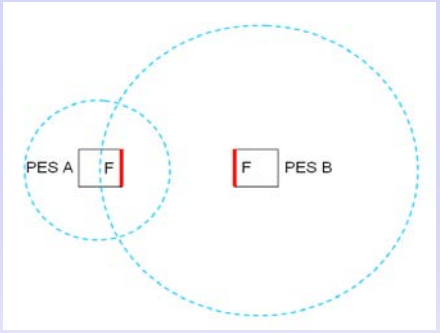
Validation of ESS Site Planner





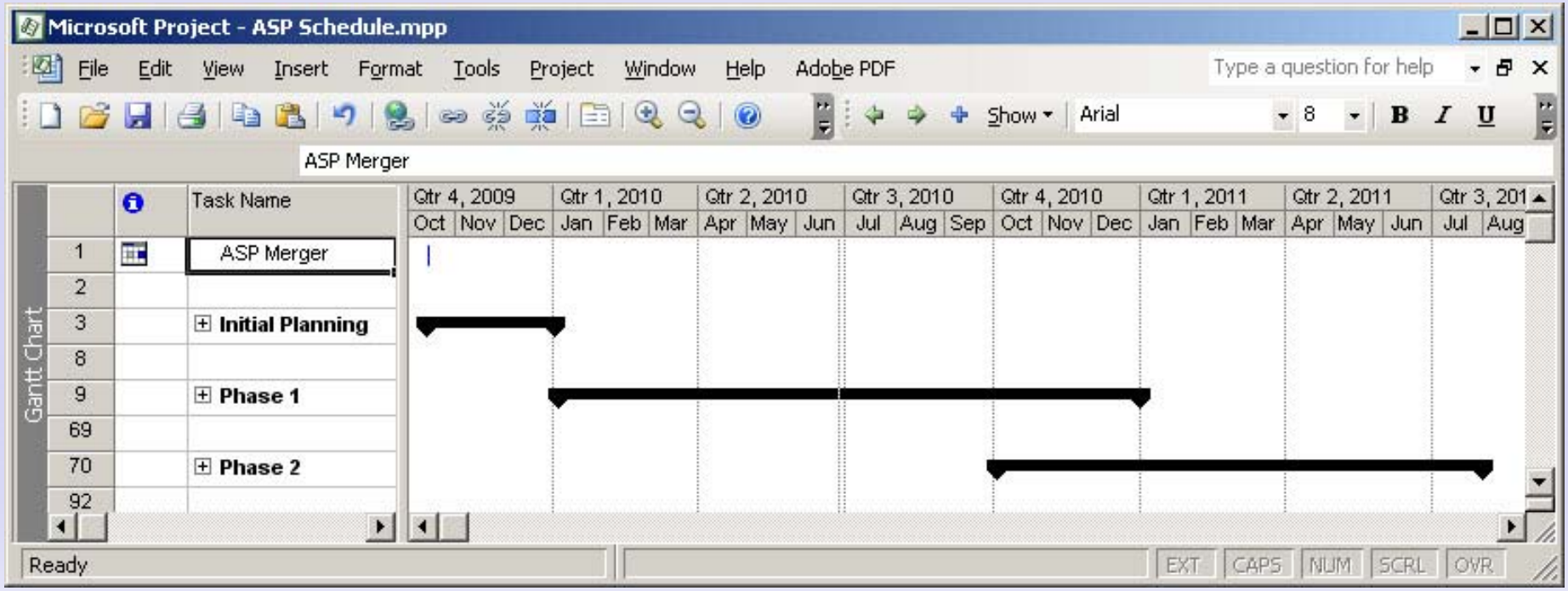




Validation/Verification Findings

- Critical Issue
  - A software problem that prevents the user from accomplishing an essential task.
  - Prevents release of the software
- Issue
  - A significant problem, but can be overcome by using a “workaround”
  - The problem will be fixed ASAP, but will not prevent release
- Minor Issue
  - A cosmetic problem, usually easy to fix.
  - The problem will be fixed ASAP, but will not prevent release

ASP Schedule



Future Plans

- Expand QD Engine to include NATO criteria (AASTP-1 and AASTP-5)
- Combine ASP applications with automated Risk-Based siting
- Add additional siting criteria
  - ✓ Energetic Liquids
  - ✓ Tunnel Magazine criteria